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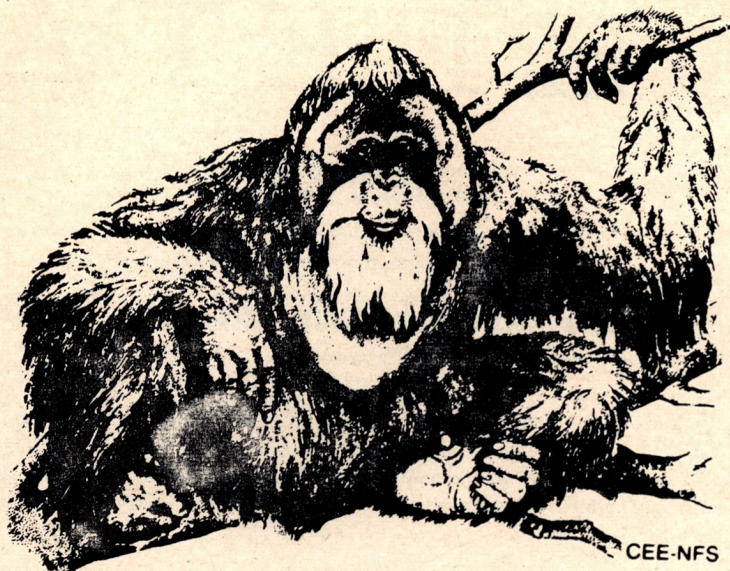
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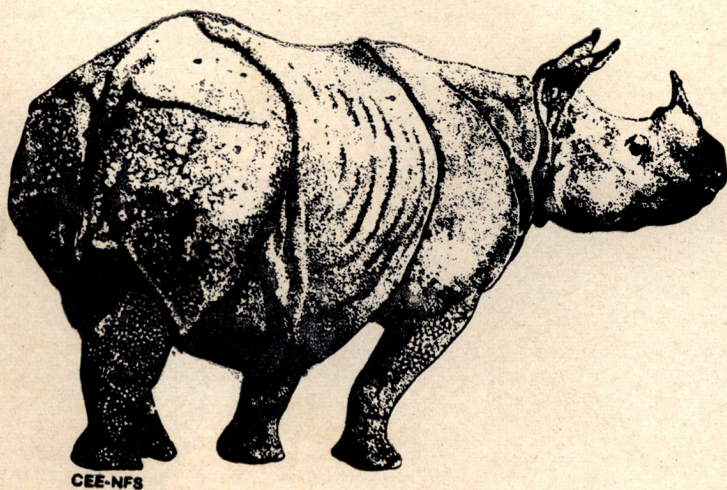
Black necked stork

Photo by—Pratap Sing





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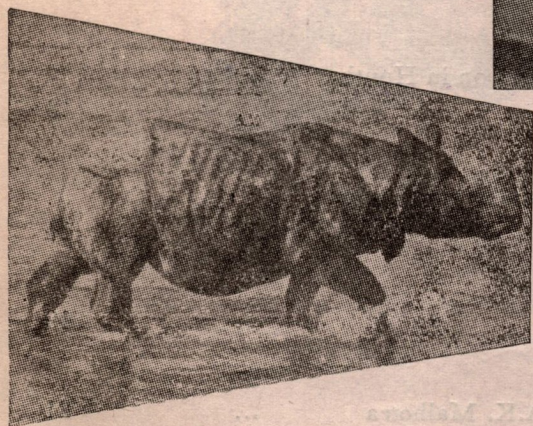
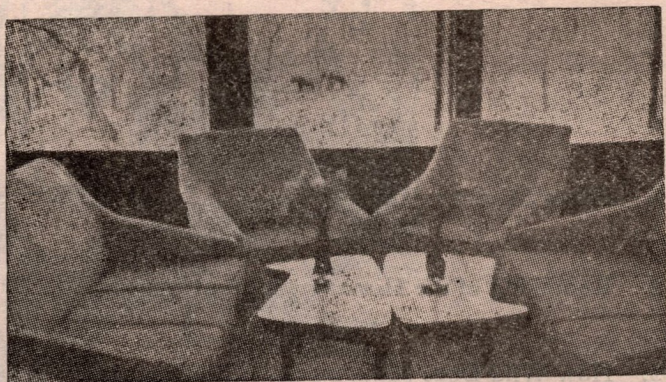
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WEST BENGAL

Prime Minister Addresses the National Water Resources Council

(Inaugurating the first meeting of the National Water Resources Council, the Prime Minister, Shri Rajiv Gandhi said:)

“Almost all our problems seem to circle around water. We first wonder whether the monsoon is going to be good enough for our harvest. While we are waiting, invariably we have some droughts. From there we go to floods, either too little or too much, always somehow in the wrong place. When we are able to have irrigation systems then we go to the next phase, we have water logging, salination with its own problems.

We have made tremendous strides in the country, but one resource that we have not been able to use to the best of our ability is water. We have not even been able to co-ordinate amongst ourselves into what would be the best use of water, since there is no policy or large decision for the use of water. Many of our states still have tremendous problems between themselves about rivers that flow through them, about how much water should go to whom.

We are only using about forty per cent of the water today. We have to first have the capability of using all the water that is available to us, and not let it go waste, and then we must have the capability of using in the best possible way. I have seen in many States, specially where irrigation schemes have come in, a lot of water is wasted. There is no feeling of responsibility with water—whether it is a farmer irrigating his field, over irrigating his field, water-logging the land, cutting canals to steal the water, pinch the water from his neighbours or whether it is in towns where either taps are left running—or there are no taps. We, somehow, don't seem to feel that water is a resource and not having water can be a problem. May be we get it too easily, but this is not going to last for long.

Planning Correctly:

Our demands are going to increase. I believe, the estimate is that we will be using all our water by the end of the century; and beyond that we will start getting into trouble if we don't plan things right today. Planning correctly means everything. Starting in the forest areas, in the hills, starting with the ecology of the area to see that the weather patterns are not changed because of our cutting into forests of our changing the whole geography of a region. From that to seeing that all the water is collected, monitored, and used at every stage, we have to see how we can modify our agriculture to suit the water that is available.

It is not necessary to grow rice in the driest areas of the country. We have to adjust our cropping patterns, the seasons in which we can use the water and finally see how we can re-use the water.

Industry is using more and more water. As industry grows its demand will increase. Slowly the concentration might shift from the rural areas as farmers get more efficient, as they learn how to utilise less and less water to get more output. We will see the balance shifting towards other uses of water. The question really is will we be ready when this crunch comes. In ten, fifteen years it is going to start getting tight. We must make a policy now that utilises the water that we have, to the best productivity. We should not worry too much about how much water belongs to this State or that State. With better utilisation, there will be very few states who are actually short of water.

The key is in not wasting the water. We are very happy flooding our fields, but in West Asia they get similar results by using may be 1/50th the water that we use. So, it is possible, but we have to train ourselves, educate ourselves, to be able to do this. We have to make a plan for using our water which cuts across the various artificial barriers that we have built, state boundaries, other boundaries, and see what is best for the whole country. I do not suggest that we reduce certain States to below their minimum requirements or below a comfortable requirement, but it is ridiculous to have water flowing into the sea going waste in certain areas, while other states are dry, other areas are dry. We have to monitor the rainfall in real time to see that corrective measures can be taken to prevent flooding so that the water doesn't go waste.

Perhaps, the most neglected area is water transport. And it is the cheapest means of transport that is available today specially for heavy goods. We have not paid any attention at all either to inland transport on canals, on rivers or in the backwaters or even along the coasts. This again is part of our water resources. And we must see how best we can utilise this."

Remaking of the Himalayan Trout Waters

By

S.B. RAIZADA

Distt. Fisheries Officer, Mandi

Himalaya, a young earth mass in terms of geological periods, has been a picture of hope and despair to this sub-continent. The vast resources in store for avid development and the climatic guarantee are a picture of hope; despair blows from human behaviour, marking incorrigible dents and defacing the benefactor.

This paper basically relates to trout fishery but bears truth in relation to the whole fishery of the mountain system of our country. This comparative of two era, and a suggestive paper, would make one realise how eco-system when disturbed negativates development process and the great responsibility this casts on us to restore the order. Fish of the mountains may not constitute much to the national economy but remember it is every bit that adds to the fabric of nation building. Fish there, can be the gauge to the eco-system beside the part it has to play in tourist industry up in the mountains.

This paper gathers theads from the paper of Mr. G.C.L. Howell—"Making of a Himalayan Trout water" appearing in the Bombay Natural History Society, Vol. XXIV, No. 2 in the year 1916 (Mr. Howell was the key figure in establishing trout fish in the Kullu hills of Himachal Pradesh. He had advised also on propagation of trout in the hills of Uttar Pradesh). In this paper I have ventured to compare the conditions prevailing then, that prompted introduction of trout from such far off lands under the hostile facilities of the days and promoted this important fishery, and the terrible decline this is now facing in spite of large advancements made since then in the science of this subject, facilities available and the efforts being put in.

History of introduction of trout in this country begins with the attempt to plant *Salmo trutta lavensis* by Dr. Francis Day, in 1863, in Nilgiri hills. Repeated attempts thereafter, mainly in Nilgiri and then in Jammu and Kashmir and Himachal, failed till the year 1900 when the right species at the right place were chosen and established with success: the Brown in the Himalayan water (J & K. in 1900 and Himachal in 1909) and the Rainbow in Nilgiris of the South in 1906.

What prompted these European settlers, the vacationers, administrators and naturalists to introduce trout, was not straightaway a creation of their known sport at the place of their sajour in India but it was at the hopeful behaviour of some of these 'finest' streams that had the quality and setting comparable—nay more enchanting—to 'home' waters. To this are now credited more than 2500 kilometres as trout streams (J. & K. 1020, H.P. 1200 km, Munnar High Range 3.4 km, Kodai hills 70 km, Nilgiri 8 km, Sikkim 250 km). This

approximates some 12,500 hectares. A fact remains that the prospectable feature is much larger since a large part of suitable cold water still remains unidentified, and unaccounted.

To look back, the Himalayan scene was just suitable to the living of the fish. The vast upland had 76% forest cover in the second half of the nineteenth century. Streams that originated from perpetual glaciers or from cold springs passed down the valleys of evergreen or deciduous forest cover and an endless undisturbed grassland. The drainage in the western and central Himalayan region and beyond was by and large over limestone bed of the mesozoic sedimented Siwaliks. River banks were shrouded with thick alder plantation (of which there are two important species all along the Himalaya that is a rich amonic salt rich plant, supported with a well spread root system of shrubs of *Barberis* and *Principia* spp. and innumerable others. Headwaters of these streams ran into cascades on coming out of glaciers and springs and then into rapids and pools farther down where a good part forming a sporting 'white feather'. The temperature was suitable, running between 6°C to 15°-20°C, and individual stream lengths good enough for fish runs. Summer environmental temperature remained under 31°C or close to 38°C at the worst. The same place touching zero and below during winters under a sufficient snowfall. The summer snowmelt swell these streams from quiet springs into wild rapids. These rapids were an assurance to proper oxygenation in the otherwise tropical environmental stress; the substrate, a stony bed, with rocks, eddies and cavities to provide shelter home to the reophilic fish.

These streams had small channels running alongside as tributaries heavily laden with water plants such as the water cress (*Nasturium* spp.) that harbour plankton of phyto and zoo group, water flea, larger insects from Trichoptera, Ephemerids, Perlids, beetles and a host of others, to be an ideal nursery ground connected to mother streams. In short, these streams were the right ecological 'receipe' for trout culture. Under these conditions the trout were introduced in the Himalaya, brought from far off lands that took months; carried on head loads into the mountains; raised hatcheries out of the local materials and carried out the cycle of annual breeding and stocking the feeble fry under most straining conditions that have been well described by Mr. Howell. One can imagine of the facilities available then that I need not repeat here.

However, the indigenous fishery of the region begins with the loaches (*Nemachylus* spp.) in the high altitudes followed by Schizothoracins down up to the temperate locality, to be followed downstream by Mahseer, *Labeo dero* and *L. diplostomus* etc. Schizothoracin breeding is well timed i.e. April and May. Swarm of their fry can be seen along the river system and in the channels from May onwards—the period that coincides with the coming of trout fry, natural or planted, in these waters. The carnivore trout fry find a palatable food in it.

Breeding of trout in nature and at farms

Trout breeds during winter, some beginning with Autumn (Brown trout) and many others close to Spring (Rainbow trout). In nature, the fish excavates a 'redd', an oval pocket in the gravel bed in the central mass of stream running parallel to stream current and ensuring that the receding winter water does not leave the site exposed. One female to one redd stand with a male or two to release egg and milt into this pocket. Thus fertilised eggs are buried back with gravel and stones, after the 'act'. Colony of redds can be seen at one place. The carnivore fish then leaves the progeny to fend for itself. The fecundity of trouts depending on species, runs from 1,800 to 3,200 per kg body weight of hen fish. The period of development from egg to fry persists for 14 weeks at 11.5°C and would prolong to 18-20 weeks at 5°-6°C, but faster, say 7 weeks, at 17°-20°C. During this period the egg and young come across innumerable risks to their life. The alvin, as the larval stage is called, is a very helpless stage that is susceptible to prey from cannibal elders, dragon fly nymph, Mayfly nymph, the stream currents and under Indian climatic conditions a winter flood would let loose the fury. Combined to this is the low fecundity and an individual's low average produce of eggs. The emerging fry has to face the snow melt swelling water and in India the list of odds is joined by monsoon floods that follow soon, the process that continues from April to September, that in eastern India begins early and lasts longer. Incidentally this happens to be the maximum growth period of the fish. Nature has, however, timed the emergence of trout fry to the increase in the availability of insects.

These factors are an explanation in itself to the necessity of artificial propagation of trout from hatchery source.

In culturing this fish, a good and healthy stock under age group 3 to 6 years—their number according to demand, is raised in farms. A healthy stock is a must. The eggs and milt are manually removed, called a process of stripping, by placing fish belly between forefinger and thumb that is worked down the belly to eject free eggs through the passage of anal aperture. Ten to fifteen minutes after such fertilization process the eggs, now called green eggs, are cleaned, sorted and placed in rectangular trays usually of size 40 × 40 × 7 cm (l × b × d), lined with 1/12 to 1/16 mesh size synthetic material or 2-3 mm perforated non rusting sheets. These trays that individually accommodate 4 to 5 thousand eggs, are laid in boxes, that were formerly made of wood and now fabricated in fibre-glass, aluminium and several other synthetic materials, usually of size 2.5 metre × 40 cm × 25 to 40 cm (L × B × D). Water flows at the rate of 12-15 litre per minute or at a demand rate of $\frac{3}{4}$ litre per thousand eggs per minute. Care is maintained against spread of fungus to which the eggs are prone after any kind of injury and from dead and rotting eggs. A treatment with malachite green (non-staining agent and zinc free), acraflavin, salt and other fungicides keep a desirable check, which during olden days were left to nature.

(The purpose of this paper is not to bring details of hatchery practices of culture side and therefore this description is kept to minimum.)

The fry is now ready for disposal in the way it is desired i.e. stocked directly into streams and channels as was the practice in the olden days; reared into fingerlings or other grown stage planting; to be raised as blood stock; to be transferred into commercial culture units etc. etc. as are the practices in most of the advanced countries.

How trout propagate in nature and that from hatchery effort :

The process of laying has been explained earlier. The feeble fry that lives to grow on stored yolk, lives gregariously in dark corners of the redd, seeking shelter against the sweeping, though not very strong, spring season currents and light. On emerging as fry the young ones move away to shallow sides of stream, or migrate into adjoining smaller and sheltered channels to obtain micro organisms as food, facing the odds of life placed before them. The lucky ones surviving such odds move into faster 'arena' of stream for a sportful return to anglers, when grown. Thus the return percentage as surviving progeny is a very small balance sheet accountable in points and fractions.

The return from hatchery plants is better but not more than 1-3% when plants are made at fry stage under most favourable conditions, that begins according to old practice in sheltered channels and safe grounds against cannibals. The fry usually remain in channel ground for six months to a year. Those that continue here act as cannibal to next year plants.

The stock thus recruited was sufficient to meet the low demand of yester years, as replenishment for the removed live stock played by a few anglers.

Role of vegetation in rotating food cycle in trout waters:

Before moving on to suggestions on improving the methods of raising trouts it is important to look into some related aspects of trout life cycle.

The forest cover, over and around trout water, acts in two ways: the vegetation in catchment area works as a general conserving agent to reduce erosion and consequently low silt drawl in streams. This facilitates more production of food from a cycle that begin with algal sheeth over stones, that harbour more diatoms in their meshwork, and then a chain of lives i.e. nymphs and larvae of May fly, Caddies fly, Stone fly, Damsel fly etc. The algal sheeth is also the food of Himalayan Barbel. More silt scraps this sheeth. Clear water facilitates in allowing more carrying capacity in a better aerated water mass. Forest cover reduces rain striking force on ground, slows down the rate and force of surface run off, absorbs rain water into soil through roots for a subsequent gradual

supply into streams after the rains. Vegetation over and close to river bank has a wide distributed work. The small and bushy plants quoted earlier, alongwith grass, hold into grip the loose sand, gravel and small stone conglomerate. Most insects, particularly beetle group, find shelter within these bushes. The tree group in conjunction with bushes hold the bigger rock mass. This rock mass has a continuous grip chain across the river substrate to the other bank. In this way, beside the river bank the river bed is also kept stable. This stability of the substrate contributes to the smooth running of food cycle. Roots of these trees hanging or emerging into water, shelter a rich fauna*. A large number of insects, mainly the species of Caddies and stone fly lay eggs on tree trunks whence their larvel and nymph stages grow under riverine stone bed. Roots of plants, and leaves, especially that of *Alnus*, provide a rich manure into rivers, as a toning agent of the medium for development of insects. Overhanging tree shade reduces effect of Ultra-violet rays besides keeping an insulation against the extremes of tropical sun on stream water. Submerged or emergent water plants growing in water channels that have been narrated earlier, have a similar role to play. With their richness of micro and macro-organisms, the stream is further enriched from material drained into them.

Such favourable conditions prevailed during the last Century and to some extent up to the end of the first half of this Century. *BUT NOT NOW.*

Position of the Himalaya and the fishery divisions:

To correlate and properly understand the management problems of trout fishery, endemic of a stable old and temperate land, to its new environment it is essential to know of the Himalayan past. Himalaya, as is well known, rose out of the sea of Tethys and have come into shape into the later pliocene period, presenting a barrier to the monsoon clouds of the oceans of the south, that now hammers down 200 to 400 cm of rain annually. Most rivers have risen out of the sea water on original beds and later washing down soil to form the plains of the North as Indo-Gangetic plains to which the Brahmaputra also played its part as one of the constituents of the 'Siwalik river'. Three distinct seasons as winter, summer and monsoon have their individual effects. Himalaya can be geographically divided north-south into Western, Central and Eastern in a width of 160 to 400 km; and east-west (that have more definite relationship to fishery) firstly as the Great Himalaya, the Lesser Himalaya and the Outer Himalaya (covering the Siwalik range) and secondly, behaviourally into Glacial, Temperate and Tropical divisions over a length of 2,500 km, roughly from Palmir Knot in the west to Patkai Bum in the east connecting the Arakan

*This is the result of my study on some plants, identified related to trout waters and is being separately brought out as "Economic relationship of some plants—*Alnus*, *Salix* and *Nasturtium*, in trout waters".

range (that now forms part of the Himalaya under general description). It is in the Lesser and partly the Siwaliks and the contiguous ranges beyond Patkai Bum that are of concern to this paper. Altitudes above 3,300 metres in the west and 5,200 metres in the east form the glacial zone that is shorn of vegetation. Vegetation of the trout related region comprise of Deodar, Pine, Ulmus, Walnut, Salix, Alnus, Larix, Hamlock, Michelia, Abies etc. etc., thorny bushes of innumerable description but Barberis and Pricepia amongst them deserve special mention, water cress as submerged plant, abound the region. These have great relative efficiency to fishery water.

Himalaya situated as it is as sentinal over the Indian subcontinent, exercise command in influencing climatic control over the country and is also resultantly influenced by its proximity to the tropics imparting wider fluctuations in comparison to an identically set location of its counterpart in Europe or North America. In the Western Himalayan region the rise is gradual whereas in the east, beyond Nepal, it is steep. The rock system of the Inner Himalaya is composed of marine sedimentary rocks, the Central Himalaya of crystalline and metamorphic rocks, schists and mesozoic sediments, and the Outer i.e. the Siwalik, of the sedimentary riverine deposits and thus have a widespread important limestone constituent.

The hard winter and soft to hot summer adds to the process of erosion. The dust laden climate of tropics, in my opinion, slows down the normal rate of oxygen exchange. But the rapids of streams compensate this affect to some extent. It will be seen that the water temperature varies in the temperate zone one degree Celcius for every approximate ten kilometres run of stream, running directly north-south. The steep gradient of the eastern Himalaya brings temperate water deep into sub-tropical zone. This has largely to explain of the availability of temperate fishery in the sub-tropical zone. Thus the horizontal Himalayan fishery division may vary from natural climatic divisions, calling for adjustments in the adoption of fish culture practices including the species and variety of fish to be introduced. For example, Mahseer (*Tor putitora* particularly) can be found at many places deep into trout waters, especially the Rainbow trout range. True fishery divisions thus need further differentiation into (1) Glacial and sub-glacial, (2) Temperate and sub-temperate and (3) the sub-tropical and tropical.

Status of the Himalaya and fishery now:

The onslaught of human race over the forest resources, directly or indirectly, knowingly or unknowingly, is not a matter to be rewritten that is known to all. This cover has come down dangerously from 76 % of the 19th Century to less than 22% (in fact this only 10%). Rivers have much less tree cover and the bushes cleared away, replaced by regular

dwelling or fields causing a physical disturbance to trouts and adding greatly to the rate of pollution. The same has been the fate of natural nurseries. In some cases an entire river stretch is exposed and the nursery area has come down to 10%. In my own study of the problem on river Beas in Kullu valley of Himachal Pradesh, the river bank cover has shrunk down to 20% in 1985 from the level of 1962, that in turn has reduced the number of pools also to 20% and simultaneously raising the 'rapids' area. The chain of resultant effects is anybody's guess. The sum total is: increased flow of silt and debris through erosion of catchment in general, river bank grip is loose dislocating the whole chain in the substrate underneath the streams. This has reduced formation of scum area on stones and thus the chain of food cycle. Reduction in the number of pools and the increased rapids have reduced the 'homes' of the fish. Inflow of nutrients is diminished and effect of sun increased, draining down of micro and macro-organisms from tributary channels into main stream that had earlier contributed to the richness of streams is terribly reduced. There is now hardly any place to plant the weak fry. The fry stocked, alternatively, directly into stream meets with faster flow and perishes—not been acclimatised to live in such conditions. The surviving little percentage meets the monster monsoon in less than a month of release. The ground for excavation of breeding redd are also shortened or completely obliterated in the eroded substrate. Excessive road construction work that usually goes along river course in hills without any alternative conservation steps, has further aggravated this problem. All these have contributed to the lowering of the carrying capacity at a time when demand is rising manifolds and in various shapes. The availability of trout per demand day is turning disgustingly low.

Summarily the resultant effect on the fishery of trout and the alternative work demand are:

- 1) The natural breeding opportunity terribly reduced, in some cases to 10% of the original available space (demanding increased farming effort).
- 2) Low food inputs turning streams in low holding capacity body (affecting carrying capacity).
- 3) Reduced natural nursery area (affecting recruitment).
- 4) Physical interference from man owing to proximity of habitations (affecting utilisation space or streams).
- 5) Pollution from human source (affecting carrying capacity).
- 6) Increased angling pressure (excessive removal of stock in comparison to recruitment, bringing more recruitment demand at farming efforts).

- 7) Increased table demand of trout fish (excessive removal of stock in comparison to recruitment and therefore more production and recruitment demand by other means—farming efforts).
- 8) Increased inflow of silt resulting into unhygienic farming condition (necessitating improvement and modernisation of farming conditions).
- 9) Increase in the cost of feed (necessitates devising of cheap, improved feed of rich constituents from local ingredients for a high conversion factor).
- 10) Low priority to fisheries administratively in mountain states (a factor that causes operational delays in projects and thus loosing time schedule).

Formation of large number of hydro-electric and multi-purpose projects and thus converting mountain rivers into large sheets of water reservoirs, has changed the aqua condition from lotic to lentic. The reophilic trout and so also Mahseer has to be given new shape and adjustment in culture and propagation aspects. These reservoirs are curse mixed with boon. The curse is by way of barrier on the migration route created at the formation of dams, affecting so far the Mahseer more immensely than trout. This has also effected aqueous physico-chemical behaviour. Mahseer has made some adjustments and re-appeared on the scene well after an initial setback in most reservoirs. This obstruction has not been very acute on the trout zone up to now but the mini-hydel projects and diversion dams in the upper reaches (temperate) would completely leave a large part dry downstream for a good part of an year and thus leaving the fish stranded. Thus will also bring these streams into low carrying capacity body. Diverting and releasing of one unfavourable stream into a smaller but favourable stream would also obliterate the fishery.

On the other hand the extended water body of reservoirs is however a blessing to be taken advantage of for large scale propagation of trout, especially commercial. These reservoirs can be grouped into two kinds: 1) reservoirs at the extreme lower end, and 2) reservoir at the mid-region i.e. the temperate zone that are a favourable body. The former types are of little value of the projected purpose (some of these may be partially prospected with Rainbow trout and if in safer region climatically and physically, can be extensively made use of under cage culture). The canals of diversion barrages are additional prospectable source on running water fish culture.

(Continued on next issue, Vol. 27, No. 4)

How Wild Dogs (*Cuon alpinus*) Use Chemical Weapon In Hunting

RAJA H. TEHSIN

In the then Mewar State Wild Dogs were often met with in the Jungles and in the first half of this century they were in fairly good numbers. Mostly their area of operation was hilly tract south-west of Udaipur, called Bhomat, which was teeming with games those days. They are called Karu-Kutta in Mewar. They also migrate to the other Jungles of Mewar. The last authentic news of the presence of Karu in Udaipur region was from Sendwara about 25 miles west of Udaipur in the summer of 1970. Three dogs were sighted and scores of villagers drove them away. Thereafter I have not heard of the presence of these animals in the Udaipur region.

In 1923 my father T.H. Tehsin witnessed a chase of wild dogs on his way to Jaisamand. Jaisamand was a favourite hunting ground of the then Maharana and the place was teeming with all sorts of game available in this region. In these jungles the Maharana released some Cheetal (*Axis axis*) and they too were thriving well. About 2 km before Jaisamand lake there was an open patch in the jungle and here my father saw five wild dogs persuing a Cheetal stag. He stopped his buggy to see the chase. The dogs were running behind the stag in V-shaped formation. The stag was lacerated in the hind quarters and appeared too exhausted and panting heavily.

Suddenly two dogs ahead in the formation increased their pace, one trotted ahead of the stag and the other remained parallel to its muzzle, just out of reach of its antlers. The dog ahead of stag slowed his pace. The stag lowered its head slightly turning sideways to impale the dog with its antlers. My father was surprised to see why this cunning brute foolishly exposing itself to such a danger. It was apparent that within seconds the dog shall be out of the field. But just at the time of the strike the dog raised its tail and the stag veered its head away from the dog, knocking the dog by its beam only. The other dog seized the opportunity of the stag's defenceless posture and caught it by the muzzle, immediately the other joined in and pulled down the stag.

From this incidence, it is clear that the dog during the pursuit accumulated the secretion in the duct situated in the upper basal half of the tail and at an appropriate time when the animal was panting heavily, ejected the noxious secretions in front of the stags nostrils so that a good amount of nausiac repelling fumes could be inhaled by the stag. The exhausted stag turned its head away from the awesome smell by reflex action towards the other dog.

The well calculated method of using their chemical weapon these animals adopt in overcoming their prey is simply marvellous.

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Studies on the Responses of Wild Animals to Moving Vehicle

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Abstract

The responses of wild animals towards moving vehicles were studied at Parambikulam Wildlife Sanctuary, Palghat, Kerala. Behaviour of animals towards the vehicle varied with the time of the day and season. Animals exhibited less fear when they encountered the vehicle during dark hours and found to be more alert at day time. Deer are more sensitive to vehicles when compared with other animals like Gaur and Wild boar. Spotted deer and Sambar deer stopped feeding and started towards the vehicle for about 15-30 sec. when they noticed the jeep. The studies have direct application in controlling vehicular traffic in Wildlife Sanctuaries.

3. Introduction

Roads play an important role in the management of the sanctuaries and National Parks. A net work of roads in these areas will increase the efficiency of protection and provide an easy access to tourists for wildlife viewing. Wild animals show a repertoire of behavioural responses towards a moving vehicle in their territory. Rest and Bailey (1979) has reported that an expanding road system and an increased traffic volume on roads affect the distribution of deer and may affect their behaviour and welfare. No studies have been conducted on this aspect in India. The present paper is based on a preliminary study of the responses of wild animals towards vehicles in Parambikulam Wildlife Sanctuary. The study will be useful in controlling vehicular traffic in wildlife sanctuaries.

4. Material and Methods

2.1 Study area

The study was conducted in Parambikulam Wildlife Sanctuary (between $76^{\circ}35'$ and $76^{\circ}50'E$ and between $10^{\circ}20'$ and $10^{\circ}26' N$). The climate, vegetation and topography of the area (Altitude 600 m) is described elsewhere (Vijayan, 1980). The sanctuary has a total area of 235 km². The whole sanctuary is well traversed with both metalled and non-metalled roads. The total length of roads is 123.5 km. This area has almost all wild animals which is peculiar to Peninsular India (Vijayan, 1980). This includes elephant, gaur or Indian bison, sambar deer, spotted deer, wild boar, Nilgiri langur, Malabar giant

squirrel etc. This study has been conducted as a part of the major work titled "Habitat utilization of large mammals in teak plantations vis-a-vis natural forests".

Details of roads inside the Sanctuary

1. Anapady State Boundary Thunakadavu	9 km
2. Thunakadavu-Parambikulam boat landing	11 km
3. Peruvareppallam-Kuriarkutty (via) Thellikkal	15 km
4. Thunakkadavu-Thellikkal (Kannimara Teak)	12 km
5. Top Thekkady road	9.5 km
6. Keerapady-Elathode Road	9.5 km
7. Thunakkadavu-Anapady (via) Seechali	6 km
8. Parambikulam tunnel entry-Kuriarkutty	12 km
9. Kuriarkutty-Karaparakutty	9.5 km
10. Parambikulam-Muduva Colony	15 km
11. Earthen Dam-Orukombankutty	15 km

	123.5 km

2.2 Methods

Observations were made while travelling inside the sanctuary in a jeep. Whenever an animal was spotted the jeep was stopped and required data were recorded in the previously prepared data sheet. Jeep is always run at an average speed of 30 km/hour. The speed has been selected in such a way to avoid the accident with animals (Allen and McCullough, 1976). After noticing an animal/group of animals following observations were made using a binocular (10×50).

1. Species of animal
2. Total number of animals in the group
3. No. of young ones in the group
4. No. of females
5. First response towards the vehicle
6. Behaviour after seeing the vehicle
7. Distance at which the animal is first noticed
8. Distance from which the animal stopped running away
9. Time of the day
10. Type of the habitat

Along with this the general behaviour of the group was also noticed. Most of the data were collected from the encounters in the morning and evening hours.

3. Behavioural Observations

Among the wild animals of the Parambikulam Wildlife Sanctuary, the deer were found to be very sensitive to the jeep. They made quick responses in comparison to other animals. While all animals have shown some sort of fear towards the vehicle, elephants have not shown any fear. They have either tried to defend the vehicle or prepared to attack the vehicle. Giant squirrels tried to move away from the road side or froze at the spot after seeing the vehicle. Jeeps arrival triggered great panic among the Nilgiri langur troupes.

3.1 Flight behaviour

Gaur, Sambar deer, Spotted deer and Wild boar ran away from the road when they heard the sound of engine or saw the jeep. After the first instinct of running away from the road, they stopped at a safe distance and stared towards the jeep for a time ranging from 15 seconds to 30 seconds. This is followed by activities like feeding or slowly walking away or again running into the bushes. In certain instances when the engine of jeep is stopped, instead of returning to the normal activities the animals again became nervous and rushed away from the sight. In the case of Gaur, they tried only to walk away unless the jeep is very near to them. Elephants never tried to run away from the vehicle. Elephant herds tried to form a congregation after spotting the vehicle. They protected the calf by allowing them to stand in the centre of the herd. In some instances they started to attack the jeep.

Sambar deer never made an alarm call (blowing) in the encounters with the vehicle. Deer usually blows when it can't effectively identify the source of disturbance, Severinghaus and Chetani (1958) also observed this phenomenon in the case of *Cervus*. Sambar always ran away with 'tail up' position. The same have been reported for white-tailed deer in Adirondack forests (Behrend and Lubeck, 1968) and also in Water buck (De Vos and Bowsett, 1966).

3.2 Flight distance

Hediger (1955) has defined the "flight distance" as the distance to which an animal may be approached before it flees. "Flight distance" is an indication of the disturbance in the area. In an unhunted/undisturbed area the flight distance will be very short compared to disturbed or hunted area. In the case of Sambar and

Spotted deer a flight distance of 30 to 50 metres were observed. The vehicle elicited no response in the animals if they spotted the vehicle from a distance of 70 metres. At this distance they continued their activity. The Gaur always tried to keep a distance of 50 to 100 metres from the vehicle.

Elephants never showed the flight behaviour. At a distance of 100 metres elephants did not show any response towards the vehicle. Mac Arthur *et al.* (1978) reported that deer is less sensitive to vehicle than to the man on foot. Wild boar were found to be having a flight distance of 10 to 50 metres. Two drawbacks of this study are:

1. The individuals with longest flight distance may never be observed, and
 2. It is not sure whether the response we observe is the initial response or one subsequent to the first flight.
3. 3 Influence of time of the day on flight distance and flight behaviour

Behaviour of the observed animals towards the jeep varied with the time of the day. Animals exhibited less fear when they encountered the vehicle during dark hours. They were not even moved away from the road at night hours. They continued to rest on the side of the road even after sighting the vehicle.

At day time animals have been found to be very alert to the sound and approach of vehicle. At mid-day very few animals were observed on the roads. It is found that deers were not seen on the roads having high vehicular traffic. But at the same time they were seen on the roads having low traffic volume. (From the pellet studies it is evident that those busy roads at day time are in use at night hours.)

4. Discussion

From the results it is seen that the range improvement works for deer will yield more result if they are done at least 100 metres away from the road side. Salt licks must be prepared 100 metres away from the road side, so that animals can use them without the fear of vehicles. Now the view line cutting is done at a width of up to 10 metres on both sides of the road. But from the study it is seen that the animals will not stay freely at this distance. So in order to get a clear view of animals for tourists the view line cutting should be done at least for a 30 metre width on both sides of the road. Rest and Bailey (1979) have suggested same practices in the case of elk (*Cervus canadensis*).

It is seen that the Sambar deer and Gaur of the sanctuary is habituated to the vehicular traffic. It has been observed from the studies of responses of white tail-

ed deer (*Odocoelous virginianus*) to vehicles and to snow mobiles that unhunted populations are more apt to habituate to these disturbances than are hunted populations (Behrend and Lubeck, 1968; Dorrance *et al.*, 1975). From this we can assume that vehicular hunting is not prevalent in the area.

It is seen that the best time to observe the animals at close distance is night time. But this is not advisable as it may affect the safety of tourists and welfare of animals. One hour before and after the sunrise and sunset may be selected as the suitable time to view the wild animals.

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Man of The Woods

By

AVANTI MEHTA

“Man of the Woods”, that is what Orangutan means in Malay—the language of Malaysia and Indonesia. Orangutans are large apes which have often been mistaken by early European explorers to be wild men.

An English captain while travelling in Borneo in 1712 came across these interesting animals, and wrote that they were up to 6 ft. tall, walked upright like men and had longer arms than men. The natives of Borneo too believe that they were once men but were changed into animals because they had mocked God

Orangutans are the next closely related animals to man after Chimpanzees and Gorillas. They belong to the highest order of mammals—the primates—which include men, apes and monkeys. The Orangs are the second largest in the world and inhabit the tropical rain forests of Borneo and Sumatra in Indonesia.

Males reach an average height of 137 cm, and weigh almost 70 kg. These shaggy animals are reddish brown in colour and are tailless. Their grey faces are either smooth and hairless or covered with short bristles. Some adult males may even be proud possessors of beards and moustaches. Their bodies are thickset, legs short and arms so long that if the Orang stands upright his hands almost touch the ground. The digits on all four legs are hook shaped enabling it to grip trees easily.

Living on trees

The Orang is well adapted to a life in the trees but this arboreal life has its impending dangers. He may land up with broken bones if a branch is unable to support his huge size.

As night sets in the Orang constructs a nest by bending down branches. A temporary nest can be built in five minutes and one is built nearly every day for an afternoon nap. An overhead covering of leaves to this nest may provide shelter during a rainstorm.

Basically a loner, the Orang gives the impression of and eccentric mumbling and grumbling to himself in an absent-minded way. A male takes up this solitary life as soon as he relinquishes the security of his mother. Travelling and eating all by himself he seeks the company of a female only for a brief period when they come together to mate.

The adult male is distinct from the female, not only because of its increased size but also due to cheek flaps that surround its face and a huge pouche which hangs from its

throat like a gigantic double chin. Both sexes have these throat pouches but in the males it is bigger and more prominent. The ancestral Orang may have used it to amplify his voice. The modern Orang, however, doesn't sing but emits an impressive call, which is a lengthy sequence of sighs and groans that lasts for two to three minutes. Most of the time he is either grunting, squeaking, hooting, sighing or making a sucking noise through his pursed lips.

Attentive care

The female Orang is about half the size of its mate and is solitary too. She wanders through the forest with her young clinging tenaciously to her fur. The female usually gives birth to one young who is born after a gestation period of eight to nine months. The young is a totally helpless infant at birth and has to be nursed by its mother for three to four years. During this time it is fed on milk and later leaves and fruit, thoroughly chewed by the mother.

The Orang mother is very attentive towards her young. She cleans the young one's fur with her teeth and bites off long nails to keep them short. Occasionally, the infant is given a wash when it rains. The young Orang depends on its mother till it is six to seven years old.

Endangered species

Orangutans are an endangered species with only an estimated 5000 surviving according to the 1966 IUCN report. But today their numbers are probably half of that. The decline in numbers is due to destruction of their habitat, forests being constantly cleared for farming and logging. Orangs are hunted ruthlessly and the young ones are illegally sold to zoos and circuses.

However, conservationists have taken steps to check these activities. The Nature Protection and Wildlife Management Wing of the Indonesian Forestry Service sends the captured Orangs to an Orang Rehabilitation Centre.

Here people with expert guidance, love and care teach these young Orangs how to survive in the wild, so that they are not left completely helpless and can fend for themselves when reintroduced into the forest.

Genetics of Black Panther (*Panthera pardus*)

By

A.K. MALHOTRA

National Zoological Park, New Delhi-3

The Indian Panther is found all over the country. According to Prater (1965) dark race exists in Nelliampatti Hill in Cochin. According to Walker (1964) black panther is colour phase of the leopard. E.P. Gee (1964) stated that there were reports that black mating with black produced black cubs but black mating with normal coloured (rosette) produced both kinds of cubs in the same litter. Robinson (1970) concluded from the mating data of black and spotted panther that black is inherited as an autosomal recessive. But in Jaguar (*Panthera onca*) black is dominant to normal colour.

Material and Methods

An adult black male panther, named Bhullu was brought to National Zoological Park from Calcutta Zoo in 1962. Bhullu was introduced to ordinary Pantheress Buddy, a gift received from Smt. Rayzu of Jabalpur.

In 1956, a four month old ordinary pantheress Tara had been presented to the park by Mr. S.S. Joshi. She was introduced to Bhullu. On 15.4.63 Tara gave birth to two ordinary coloured female cubs, named Ganga and Yamuna. When matured, Ganga was introduced to Bhullu and on 24.4.67 a still born cub (ordinary coloured) was born, but Ganga still had trouble and on 28.4.67 a black dead cub was helped out from her. A complete breeding chart of Bhullu with Buddy Tara and Ganga is given in Fig. 1.

At M.C. Zoological Park, Chhatbir (Pb.) a black male Shankar and ordinary female Danger were brought from Gauhati Zoo in 1979. They were allowed to mate, and produced 7 cubs in three litters, out of which two were black. Bhola, an ordinary colour panther, was brought from the forests of Assam and female Papi (ordinary coloured) from Gauhati Zoo. This pair produced 7 cubs in 3 litters, of which one cub was black in each litter. A Geneological chart of panthers of M.C. Zoological Park Chhatbir is given in Fig. 2.

The result of matings of black panthers at N.Z.P. and M.C. Zoological Park, Chhatbir is summarised in Table 1.

Result and Discussions

The result of breeding indicates that the black coat is recessive to normal one, for none of 8 cubs of Buddy x Bhullu, Tara x Bhullu had the black coat. If the normal coat colour

MALE ♂ SPOTTED ☺
 FEMALE ♀ BLACK ●
 DIED —

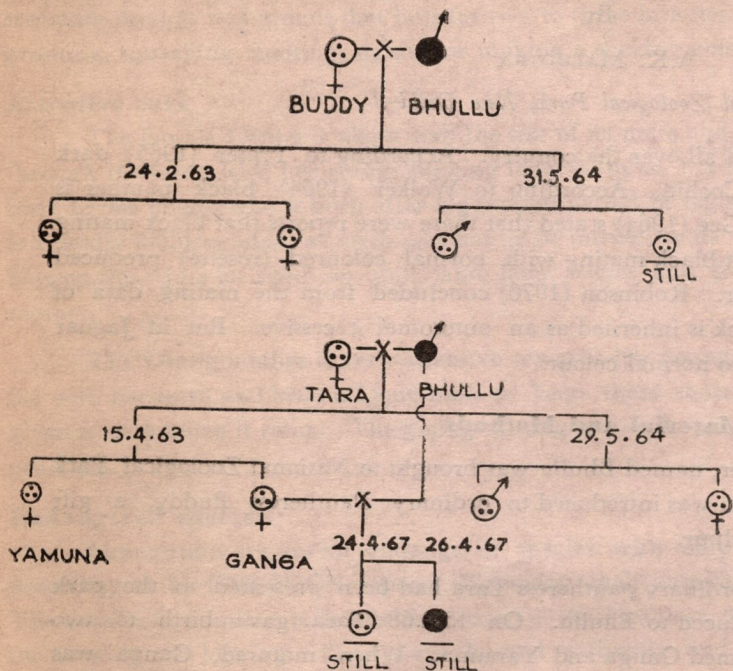


Fig. 1. Geneology of black panthers at National Zoological Park, New Delhi.

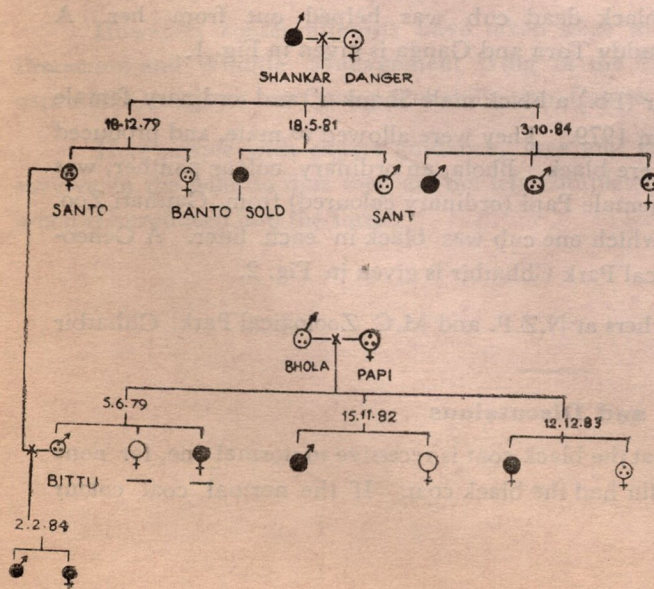


Fig. 2. Geneology of black panthers at M.C. Zoological Park, Chhatbir (Pb.)

Table 1

Results of matings of black panthers at N.Z.P. New Delhi and M.C. Zoological Park, Chhatbir

Matings	No. of litters	Spotted cubs	Black cubs	Total
N.Z.P.				
Between ♂ x bb x ♀ BB				
Bhullu x Buddy	2	4	—	4
Bhullu x Tara	2	4	—	4
Between ♂ bb x ♀ Bb				
Bhullu x Ganga	1	1	1	2
M.C.Z.P.				
Between ♂ bb x ♀ Bb				
Shankar x Danger (presumed)	3	5	2	7
Between ♂ Bb x ♀ Bb				
Bhola (presumed) x Papi (presumed)	3		3	7
Bittu x Santo	1	—	2	2

is controlled by a dominant allele B and the black colour by a recessive allele b, the normal coloured leopards are either homozygous (BB) or heterozygous (Bb), the genotypes of Bhullu, Buddy and Tara can, therefore, be written as bb, BB and BB respectively, all their offsprings being heterozygous. Danger is presumed to be heterozygous or else she could not have produced black and normal coloured cubs when she was mated to black panther. Ganga, a known heterozygous, when mated with black Bhullu produced black and spotted cubs at N.Z.P. (Fig. 1 and 2). Further the cross between Bittu and Santo, known heterozygous produced black cubs at M.C. Z.P.

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Bears For Tick Control

Villagers in Dharwad, North Karnataka make use of the Indian bear for the control of ticks in cattle sheds.

This fascinating information came to light during the course of collection of ticks from domestic animals in the vicinity by two biologists, Sarvamangala Harlapur and L.S. Hiregondar of the Agriculture College, Dharwad.

The biologists who saw the bear in action in a village near Dharwad, reported their find in the Journal of the Bombay Natural History Society. Describing the process, the biologists said that a cattle shed was selected and was evacuated. The bear was then taken inside. It began to smell places where a large number of larvae, nymphs and adult ticks were collected and began to lick them up. Other immature and adult ticks in crevices were sucked in and swallowed and those deep inside the ground were dug out with its claws. The entire operation took 15-20 minutes.

The biologists said that this is a normal practice employed whenever a bear visits a village. A close examination of such treated cattle sheds, showed that the tick population on the body of the cattle came down abruptly and ticks did not appear for the next 4-6 months.

Although free of any harmful side-effects, the method has its limitations, since the bear population has come down heavily in recent years. (CEE-NFS)

Kangaroo Slaughter

CANBERRA (CEE-NFS): The Australian Government's permission to kill 2.5 million kangaroos this year—a big increase on last year's cull, has raised protests from conservation from Canberra to London and counter claims from Australian scientists that the cull does no harm.

Conservationists say this will be the biggest massacre of wildlife in the world and if maintained will lead to the extinction of the kangaroo within 20 years. According to a report in New Scientist the Red and the Gray Kangaroos are greatly endangered by the cull. On the other hand scientists attribute the protests to emotive nonsense and justify the slaughter on the grounds that if culling is stopped the kangaroo population will assume pest proportions. Kangaroos are uniquely adapted to the arid ecology of Australia. After every catastrophe they register an increase in numbers leading to population explosions.

Considering long-term prospects of survival, the species is under less threat from professional culling than from indiscriminate killing by farmers. With sensible management it is possible for kangaroos to remain Australia's national symbol. (CEE-NFS).

At Man's Mercy

By

ROOPAL RAWAL

Mighty and majestic, the ferocious looking rhinoceros is the third largest land animal after the elephant and hippopotamus. Though a rare sight today, rhinos were numerous and conspicuous about 5000 years ago. The fall in their population came during the last two centuries—not as commonly believed, due to evolutionary failures. The rhino's size itself deters wild predators. Indeed, its only enemy is man. Extermination for sport, horn or hide and encroachment upon its habitat for agriculture and tea plantations, threaten the rhino's survival. Rhinos are heading towards extinction faster than any other large mammal in recent history. Kenya has been specially hard hit by poaching. Out of 20,000 rhinos in 1970, only 550 survive.

The horn, the toes, the skin, the stomach, the bones and even the dung—almost every part of the animal serves man's unending lust. For centuries, rhinoceros horn—compacted hair-like skin fibres—has been used to make cups, bowls, daggers, bows and arrows, decorative carvings, sword hilts, walking sticks, door handles, butts of rifles and pistols, the list is endless. Rhino horn and hide are believed to cure asthma, tuberculosis, and snake bites. It is also claimed to have aphrodisiac powers.

Unsavory customs, like bathing in rhinoceros blood to acquire courage, and hanging a rhino tail over the bed of a woman to ease childbirth pains, have also been prevalent. Other meaningless practices are men using rhino horn as a talisman and rubbing ash of rhino horn on the eyebrows to help attract beautiful girls. These beliefs have proved fatal to the rhino. The trade in rhino products is banned. Nevertheless, it does thrive clandestinely.

The Rhino family

There are five rhino species in the world: three Asiatic species—Indian rhino, Javan rhino and Sumatran rhino; and two African species—Black rhino and White rhino. The Javan and Sumatran have been comparatively less studied as they are extremely difficult to get close to. According to the latest census, there are only around 70 Javan and 503 Sumatran rhinos left.

The Indian rhinoceros is the Greater One-horned rhino and as the name implies has only one horn. Once it dwelt all along the foothills of the Himalayas, Terai region in particular and the valleys of the rivers Indus, Ganges and Brahmaputra. Today it is

restricted to scattered pockets in India and Nepal. There are less than 1800 left and the largest herd resides in Kaziranga National Park, Assam.

The Indian rhino has thick skin with several folds add not much body hair. Though bulky, the body folds enable it to run fast, jump, twist and turn rapidly. African Black and African White rhinos have two long horns and lack those deep folds that Indian rhinos have. White Black rhinos are solitary, White rhinos are more gregarious. The White rhinos are actually grey in colour with a long head and wide square mouth. African rhinos inhabit low-lying plains whereas the Indian rhinos live in the 12 ft. high elephant grass.

Born Swimmers

Of all the five, Indian rhino is perhaps the best swimmer and loves water. To watch a rhino wallow is a hilarious sight. They roll and thrash water with their legs in the air. Mudbaths are their favourite pastime. Wallowing serves several other purposes; to lower the body temperature and to prevent fly-bites. Wallowing places are popular for friendly meetings: a common place used by rhinos of all ages and both sexes. The calves are more active. The rhino calf is born after a gestation period of about sixteen months. The mother stays with her calf for three to four years.

Defecation by rhinos at the same spot results in formation of large dung heaps. The rhino kicks the dung with its hind legs after defecation. This gives it the scent of its own as well as neighbour's dung. Any outsider with a different smell is charged away by the residents. Unlike the African rhinos, the Indian species has glands in the forefeet to leave scent trails.

Rhinos are vegetarians. Their diet consists of grass, leaves, fruits, shrubs, aquatic plants and agricultural crops. The horns help dig up roots and other food from the ground. The prehensil upper lip of a Black rhino can be extended to grasp twigs and leaves. Despite these advantages, a rhino is severely handicapped by its poor vision. But they do have keen senses of hearing and smell.

Though belatedly, steps towards the coservation of rhinos have been initiated. That appears the only way to save these magnificent creatures, otherwise their future is grim.

Courtesy—CEE—NFS

Cannibalism (?) in Tigers

By

S. DEB ROY I.F.S.

Tigers are habitual carion-eaters and often eat up the flesh of its own conspecific also. There are many instances recorded, where a Tiger had killed another (mostly of identical sex) and later on eaten up the flesh of the vanquished. Most such incidents are clearly proved by unmistakable indirect field evidences and can certainly be taken as true. But whether this behaviour of the tigers can be termed as "cannibalism" probably leaves room for some discussions. According to some biologists any species of predators can be termed "Cannibal" only when a member of the species hunts its conspecific as a prey animal and eats up the carcass.

Fighting amongst tigers is quite common in areas where their density is reasonably high and there is probability of chance-meetings or encounters. The reasons behind such fights can be varied but the most prominent being sexual urge and competition in acquiring a mate. The next serious reason could be a nursing mother protecting her litre. There could be many other reasons of intraspecific fights amongst tigers like defending territory (?), defending a kill and the like but I consider only the first two reasons could ensue a desperate fight to the finish or near finish. Usually a moderately strong demonstration is sufficient for the resident animal to put the intruder or the challenger into retreat, though there could be few exceptions.

Tigers are highly intelligent animals and the consequent behaviour by individuals may vary widely. I have personally observed some very brave tigers and also some very timid ones. Naturally under identical set of circumstances the behaviour from different animals (Tigers) are only too likely to be different depending on their psychological reaction at that point of time.

However, once a severe fight ensues between two tigers and one is killed by the other, who did not sustain any serious injury, the victor or the winner, in most cases, may find the dead conspecific as good meat and eat the same. This behaviour may be a reflection of its predatory instinct as also conserving food and to some extent its pride. But whether this behaviour of the tiger can be termed as true "Cannibalism" is the moot question.

In the thick cover of our jungles in Assam it is very difficult to observe tigers and their behaviour. But even so I have come across some incidents where a tiger had killed another

and eaten up the carcass quite extensively. During 1970 in Kaziranga such an incident took place, where a full grown male tiger was killed by another, of almost identical size, and the carcass was eaten up substantially. Some labourers had been camping near the place of occurrence and they heard fierce growling of two tigers quite close by. This went for more than ten minutes, as they said, after which silence descended. Curious as they were next morning some of the labourers went to check up the area from where the terrifying sounds came during the previous night. They soon came upon a carcass of a tiger lying in an open nullah bed amongst flattened reeds. They also found another live tiger sliding away from the site. The two persons did not dare go any closer to see what had happened and retreated. The matter was reported to me on the evening and I went to the spot on the next day i.e. after nearly 50 hours.

The dead male tiger had been dragged from the place, where it had died, to a short distance of about 10 metres and lay in a tunnel formed by tall reeds. The hind quarters up to the left rib-cage had been eaten up. There were unmistakable pugmarks of a male tiger and canine marks on the carcass, which left hardly any room for doubt about who had eaten the carcass. On the day of my visit, the carcass was not touched and I could find no evidence of the winner being anywhere close by.

The intestine and entrails of the half eaten tiger were lying in a separate heap within about a metre and half from the carcass. The back of the shoulder bore some fierce slashing marks and there were distinct canine marks on the neck of the victim, which probably indicated that the winner somehow got a firm grip on the back of the neck and in an attempt to pin down the struggling victim slashed his back with his claws. The flattened reed bed and deep scratch marks on the ground indicated that the fight had been limited in a space of about 10 m² on the dry nullah-bed.

I had a long discussion about this incident with Prof. Paul Leyhausen, who was the chairman of the cat group of the S.S.C. I had taken this case to be a concrete example of cannibalism. But Paul Leyhausen differed with me and suggested that if the mode of attack of the winner tiger could be conclusively proved to be the mode of hunting, it could have been taken as cannibalism. He said that in case this had been a chance encounter of a fight for other reasons, it could not be termed as cannibalism, even though a large portion of the dead tiger was eaten up by the other.

But then on 20th December, 1981 another very interesting incident occurred in Manas. In the early evening of that day I was informed that a tiger had been killed by another in Manas. A party of visitors on two elephants had been taken out for animal viewing and they came up on a freshly killed dead tiger, by the side of which another much

larger tiger was sitting. I passed on instructions that the place should not be disturbed and I would go to investigate on the next morning. But unfortunately before my message was transmitted to the local officer in charge, he had already proceeded on two elephants to retrieve the carcass, as he thought, we may salvage a perfect pelt.

Next morning I saw the carcass, which was a female just short of 7'-11" (along the curve) and in perfect health. I estimated her age to be almost four (latter confirmed from her canine) and she was still to drop her first litter. There was one single bite mark on the nape with four distinct canine punch marks, two on either side of the neck. The vertebral column had been snapped on the first joint below the skull, which probably caused her almost instantaneous death. Surprisingly there was not even another scratch mark anywhere on her body. The tigress was not in oestrous.

I then went to the place of occurrence for field investigations. The area was a riverain tract with Sisham and Semul saplings scattered in tall grassland. The incident took place in a dry stream bed about 25 to 30 metres wide. The stream bed was bare with sand and gravels without any cover. From the track of the tigress, I found that she had walked along the stream bed for nearly one km from the South-west, till she reached the place of her impending doom. There on a pure sandy patch she probably sat dog-fashioned looking forward to the North east.

When I checked the track of the killer, I found that he had also come from the same direction, but along the high right (west) bank, where there were plenty of cover available. From the tracks it was found that he had been stalking the victim for nearly 400 metres. Because at quite a few places I found the unmistakable stalking pug marks, the pug marks of hind legs preceding those of the front foot at the edge of the high bank. In the clear spaces between two covers along the edge of the high bank, he had hurried along.

The tiger had also squatted behind a cover at one place, probably watching the tigress, who was now sitting almost in the middle of the coverless dry stream bed.

He then advanced a short distance, probably by crouching, as could be seen from the revealing pug marks and then went down the steep high bank into the stream bed following an animal track. He was now in the open, but at the rear left flank of the sitting and most probably unsuspecting tigress. He had advanced on the sandy stream to within 10 to 12 metres of the tigress and in two bounds had pounced on the tigress from her back left flank.

The ground bore hardly any evidence of struggle by the victim, but she had defecated there. She was then dragged to the right (west) bank and taken up the steep 12/13 feet bank

along an animal track. He then dragged the kill to about 25/30 metres away and sat in some grass cover, where my men had detected him with the kill. When my men had approached him, he grunted and growled fiercely, indicating his reluctance to abandon his kill. But our trained elephants demonstrated and succeeded in driving him away.

It was also seen that the tiger had followed the departmental elephants for nearly one km probably after the kill was lifted and being brought to the office. It is quite interesting to note that during my inspection of the site I saw more than 20 Hog deer, 4 wild boars and a small herd of wild buffalos within a radius of one km or so, which is a pointer to the fact that there was no dearth of natural prey animals in the close vicinity.

I made an attempt to locate and see the killer, but failed, as he had crossed a flowing stream from where I lost his trail. But he seemed to be the resident male, whom I knew quite well, as I had seen him on a number of occasions earlier in the same area. On casual ocular estimations, that I could make about him, he seemed to be a very thickly set, rather stockily built large tiger, may be around 9 to 10 years old. I have come across the same animal a few times later on also.

The above incident is an interesting case study where a Tiger had most probably stalked, attacked and killed a tigress, apparently for no other reason than with the intention of subsequently eating the dead. Though the point could not be conclusively proved beyond doubt, as the carcass was removed by my staff from the possession of the resetting tiger, yet in all probability I assume that the "kill" would have been eaten up and in such an event true cannibalism in Tigers could have been proved.

As mentioned earlier, it is extremely difficult to observe and study the tigers in our jungles in Assam. I know of many authentic reports from our reliable staff regarding a tiger eating a specimen of its own species, but I have never been able to clearly establish that the killing was done with the specific objective of consuming the "kill".

But since it is a fact beyond any doubt that tigers sometimes do eat the flesh of its own species, it can be (arguably ?) termed as "Cannibal". The psychological approach of killing seems to me to be of not much of consequence in the matter. However, Dr. Kotwal's article in *Cheetal*, Vol. 27 (September and December 1985) was interesting and I would request anybody who may be interested in the subject may throw more light on the subject from one's experience.

The above is a discussion following the article written by Dr. Kotwal in page 28 of *Cheetal*, Vol. 27, September-December, 1985.

Effects of Drought on the Wintering Cranes at Rajkot, Saurashtra

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Introduction

The Saurashtra peninsula, situated on the western part of India, lies between lat. N 20° 10, and 24° 45' and long. E 68° 10' and 70° 30'. This region is surrounded by coast on three sides, comprises of five coastal districts (Junagadh, Amreli, Jamnagar, Bhavnagar and Rajkot) out of six. On the north, it is surrounded by the Rann of Kachchh and the eastern side is linked with the Gujrat mainland. This region has an undulating topography with flat-top hillocks, gradual slopes and low lying areas. The highest peak is Mt. Girnar rising up to 1117 metres above mean sea level. The lithology of Saurashtra have outcrops of basalt (Deccan trap) of late cretaceous period and along the coastal margin tertiary sandstones occur. The radial drainage pattern dominates with numerous streams and rivers emerging from the central high land merging either into the sea or the Little Rann. The rivers are seasonal and have very quick response to rainfall due to the hard rock topography of the catchment areas. Also, the lower reaches of the rivers are tidal, the marine water coming up stream during the high tides.

The climate of the Saurashtra region is tropical arid to semiarid. The rainy season starts by the month of June to July and ends by the month of September. The rains season is followed by the transitional month of October followed by winter. At times, sporadic winter rains are experienced. By March/April very hot and dissicating summer sets in. The major rainfall is confined to the monsoon season only, which is erratic in nature. The average rainfall is 800 mm, decreasing from southeast to north-west.

The territory of Saurashtra, 64339 sq. km., is having human population over 9,600,000. The main occupation of the people is agricultural, and the economy of the region is dependent on cattle industries also. The major agricultural crops of Saurashtra are groundnut, cotton, bajra, jowar, and sugarcane. In addition, they cultivate different cereals and pulses as mixed crops. The cropping season for groundnut, bajra, jowar, cotton, and the different cereals and pulses are from June/July to October/November. The wheat, which is a 'rabi' crop is grown in between December and March. Mixed cropping pattern for the cereals and pulses is common.

The agricultural pattern, the general topography, and the availability of numerous water-holes, both natural and artificial, provides suitable habitat for the wintering cranes in Saurashtra. Failure or scanty monsoon is not a very rare phenomenon to this region and different is not the case this year also. An attempt is made here to furnish the effect of drought on the migratory cranes, *Grus, grus* (Common Crane) and *Anthropoides virgo* (Demoiselle Crane). A little information is included regarding the Sarus Crane (*Grus antigone*) which too exhibited fluctuation in its population.

Migrating Pattern

The study was carried out at Rajkot, Saurashtra for the last three migratory seasons (Table 1, Fig. 1.).

Table 1. Comparison of the mean number of both the species of cranes during the normal years and the drought year

Season	Common Crane Mean $\pm$ sd (range)	Demoiselle Crane Mean $\pm$ sd (range)	ΣX^2 Value
Normal Year (rainfall, 1984: 585.4 mm)	85 $\pm$ 16.35 (0—72)	1426.85 $\pm$ 1330.85 (1-5702)	$X^2=186.2$ df=1
Drought Year (rainfall, 1985 339.6 mm)	52.25 $\pm$ 74.69 (9—164)	297 $\pm$ 314.1 (0—729)	$P<0.01$

Both the species of cranes, Common and Demoiselle, are seen to arrive in Saurashtra by September and leave by March-April. The birds have been observed coming through north-west Pakistan in August-September on to the southern migration. After landing in Saurashtra return back almost same route which is not yet fully discovered, in different flock size. Both the species have been recorded migrating together and most of the occasions it is difficult to differentiate the two species at the height at which they fly. The differentiation is possible with the specific call they give during flight.

There is evidence that the cranes fly over the gulf of Kachchh as was observed on 27 December 1985 near Jodiya when a flock of 12 Common Cranes were seen coming in from the north (across the Gulf) during their southward migration.

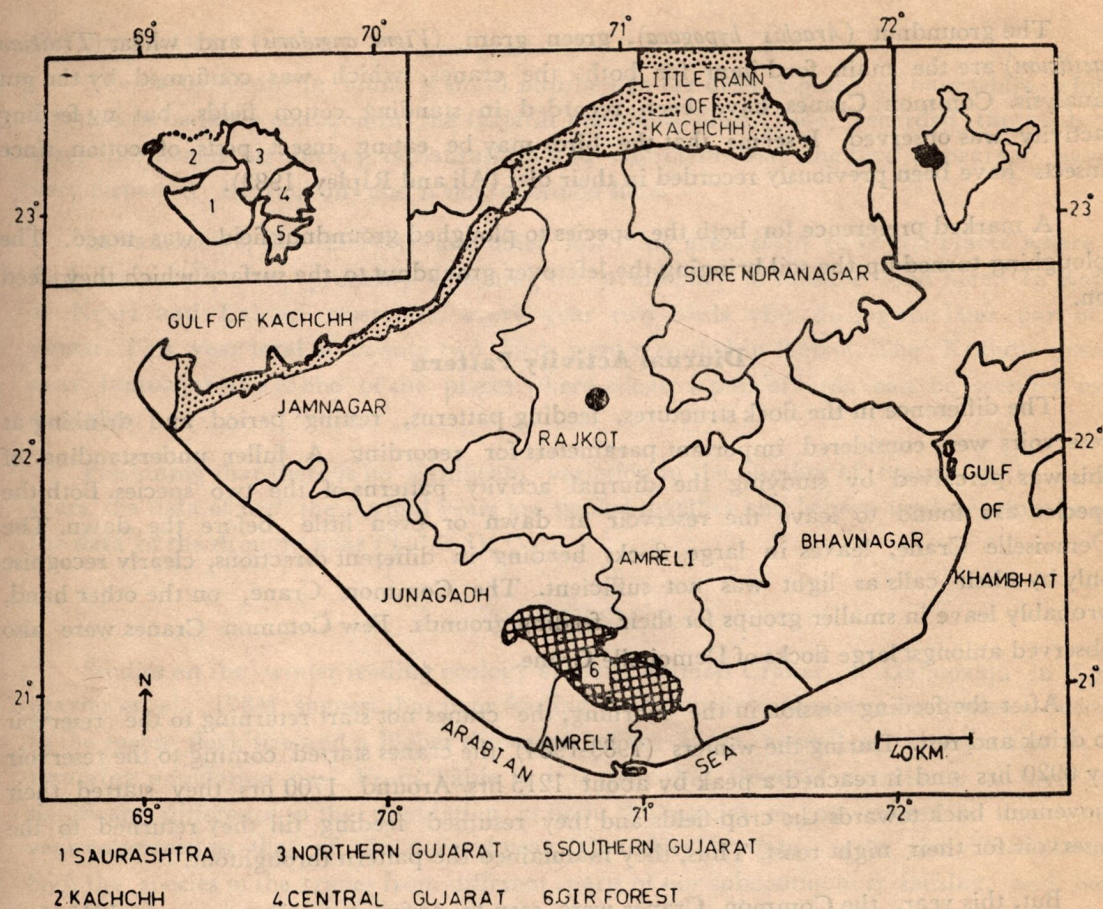


Fig. 1. Map showing Saurashtra region.

Before return migration begins in March/April, there is an increase in the flock sizes and concentration of the birds in extremely large numbers at suitable locations (Fig. 2). In Rajkot, the Lalpari reservoir was recorded to have a gathering of 20,000 Demoiselle Cranes on 22 March 1985 with a corresponding low number of the cranes in the nearby reservoirs indicating premigratory flocking (Shah et. al., in press). This too was observed in the Khijidia Bird Sanctuary near Jamnagar. During the onset of return migration cranes can be heard moving during mid-night.

Food and Feeding Habits

The Demoiselle Cranes feed in groups, size ranging from a few birds to as many as 150-200 in a single crop field (Fig. 3). The Common Cranes are usually observed feeding in social group of 4-14 birds, and sometimes larger flocks of upto 25-30.

The groundnut (*Arachis hypogaea*), green gram (*Vigna angularis*) and wheat (*Triticum aestivum*) are the main food item for both the cranes, which was confirmed by the gut analysis. Common Cranes have been recorded in standing cotton fields, but no feeding activity was observed. It seems that the birds may be eating insect pests of cotton since insects have been previously recorded in their diet (Ali and Ripley, 1983).

A marked preference for both the species to ploughed groundnut field was noted. The ploughing turned up the soil bringing the left over groundnut to the surface which they feed on.

Diurnal Activity Pattern

The difference in the flock structures, feeding patterns, resting period and drinking at reservoirs were considered important parameters for recording. A fuller understanding of this was perceived by studying the diurnal activity patterns of the two species. Both the species are found to leave the reservoir at dawn or even little before the dawn. The Demoiselle Crane, leaves in large flocks heading in different directions, clearly recognise only by their calls as light was not sufficient. The Common Crane, on the other hand, probably leave in smaller groups for their feeding grounds. Few Common Cranes were also observed amongst large flocks of Demoiselle Crane.

After the feeding session in the morning, the cranes not start returning to the reservoir to drink and rest. During the winters (1983-1984) the cranes started coming to the reservoir by 0920 hrs and it reached a peak by about 1215 hrs. Around 1700 hrs they started their movement back towards the crop fields and they resumed feeding till they returned to the reservoir for their night roost. Thus, they maintained the pattern throughout.

But, this year, the Common Cranes were seen to arrive in small groups at 1215 hrs, increasing to the maximum at 1615 hrs. The Demoiselle Cranes, on the other hand, arrived at 1310 hrs. in large flocks and their number reaching a peak by 1700 hrs. After the afternoon rest, where both the species may mix, the Common Cranes started leaving at 1625 hrs. while Demoiselle Cranes at 1725 hrs. Both the species were seen heading towards the crop fields where they were seen feeding actively till dusk. Sometimes small number of birds of both the species remained at the reservoir. When light was fading cranes were still seen feeding in the adjacent crop field, but a majority of them have gathered in open dry ground near the water. It is possible that the birds feeding till late would join the others already resting.

But a change in the general pattern was observed when they started showing the premigratory flocking, where they spend more time in feeding. At times, few of them were seen feeding in the moonlight also.

INDIAN SARUS CRANE (*Grus antigone*)

The Sarus Crane is found in small numbers in the drier regions of Saurashtra while it is found to be fairly common in the Gujarat mainland. Gole (1984) recorded the birds only three sites during his survey of Saurashtra and comments that the bird appears to have a very dispersed distribution and is not common here.

In Saurashtra, the reservoirs and other low lying areas seem to be the places where the birds are usually seen, probably reflecting the availability of suitable food here. In Rajkot, at Nyari and Lalpari reservoirs, every year two birds visit during the later part of the winter. This year total of twenty two birds were recorded in Rajkot. The Khijidia marshes near Jamnagar also is one of the places where atleast a pair of birds can be seen on every occasion.

Presuming that there is no significant variation in the number of cranes in the normal years, the data of both the normal years are pooled together and is been used to compare with the data of the drought year (Table 1).

DISCUSSION

Studies on the winter feeding ecology of the Common Cranes at Gallocanta in Spain (Javier et. al., 1984) suggest that poor feeding conditions in mid-winter determine a decrease in the mean flock size and a higher dispersion of the birds as well as a reduction in the wintering population size. From Table 1, it is clear that there is statistically a very high significant difference in the population of both the species of the cranes in the drought year compared to that of the normal year. Considerable data on the individual niches of both the species of the cranes from different parts of our subcontinent is lacking, and hence it is impossible to come to any definite conclusions. But one can infer that the lack of food and thus an increase in the competition for the food in their individual feeding grounds coupled with the drying up of the marshes and the low lying areas might have compelled them for a wider dispersion. This could be the possible reason for the influx of the Common Cranes this year and the low number of the Demoiselle Cranes.

Further, the record of 22 Sarus Cranes can be attributed to the drying up of the reservoirs and the old marshes which are the favourite places of this crane.

Gole (1984) recorded the cranes in Saurashtra at the reservoirs between 1030 hrs and 1700 hrs in the month of January and February. Our results also coincides more or less (0920 hrs to 1720 hrs) with his observations. The protracted visit of the cranes to the reservoirs during the hot hours of the dry clearly exhibits a well planned feeding pattern of the cranes, with two active feeding times; morning and late evening. This feeding pattern

facilitate the birds to keep themselves away from the farmers who scares them off so often from the crop fields.

But different was the pattern observed this year. They came late and left early. Thus the observation shows that there was an additional usage of about 4 hours by the cranes for feeding. It should be noted here that, due to the drought a general decrease in the cropping, low yielding, and less human activities were observed in the crop fields. Thus it can be concluded that the drought has put the birds for a wider foraging resulted in the significant difference in the population size and increased feeding time which in turn was shown by the additional usage of 4 hrs. Thus, the poor availability of the food due to the drought was the reason for their significant fluctuations from the normal pattern.

Apparently, the diurnal activity pattern gives us an idea about the movement pattern of the birds in their wintering habitat. Thus is of great help to biologists indulging in the population studies of these cranes. From the study, we would suggest that large water holes or reservoirs are the best places to conduct the census of these cranes. Besides, at normal circumstances noon would be the best time for taking the counts. But, it is cautioned that, the diurnal activity cycle of the cranes would not be timed the same over the winter season but would vary with the sunset and sunrise timings, nearness and density of food sources, and the weather conditions.

Only very little information is available regarding the ecology and behaviour of these cranes in their wintering habitats. As it is founds that the crop fields are the the main foraging sites of these cranes, the study is of great significance. Here, at present, a study is progressing in this direction. Much work at the wintering grounds of these cranes are of great importance and is the need of the hour.

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पक्षियों में प्रणय-प्रदर्शन

डा० विनीत विल्डियल शर्मा *

संस्कृत साहित्य में पक्षियों के स्वभाव, प्रवृत्ति, आकार-प्रकार एवं उनके प्रणय-प्रदर्शन को इतनी अधिक चर्चा है कि जितनी अन्य किसी साहित्य में शायद ही हो। संस्कृत-साहित्य के अनुशीलन से पक्षियों के विविध गुणों एवं समावली का इतना ज्ञान प्राप्त होता है कि पक्षी जगत का आधुनिक विज्ञान, आर्नाथोलॉजी भी उसकी ऊँचाई को नहीं छू पाया है। विश्वविख्यात पक्षी-शास्त्र विद् डा० सलीम अली के शब्दों में —“संस्कृत साहित्य में पक्षियों के नामकरण, उनके गुणों, उनकी पुकार, रंग, प्रवृत्ति, शरीर के आकार तथा खाद्य पद्धति के आधार पर किया गया है। अतः संस्कृत नामों की सहायता से पक्षियों को पहिचानना तथा उनका वैज्ञानिक नामकरण अत्यन्त सुविधाजनक होता है। सर्वप्रथम डा० रघुवीर ने 1949 ई० में अपने शोध पत्र—“इन्डियन साइन्टिफिक नॉमनक्लेचर ऑफ दी बर्ड्स ऑफ इन्डिया, बर्मा एन्ड सीलोन” में संस्कृत के 250 शब्दों की सहायता से भारतीय पक्षियों का नामकरण एवं उनको पहिचानने का प्रयास किया था।

13वीं सदी में संस्कृत विद् श्री हंसदेव ने संस्कृत साहित्य के आधार पर पशु-पक्षियों का बड़ा ही मार्मिक वर्णन अपनी संस्कृत पुस्तक “मृग-पक्षी-शास्त्र” (साईन्स ऑफ बर्ड्स एण्ड एनीमल्स) में किया है। डा० हरोनारायण आचार्य, अहमदाबाद ने भी संस्कृत साहित्य के अनुशीलन के आधार पर पक्षियों का अध्ययन करने का सफल प्रयास किया है। लेकिन संस्कृत साहित्य में पक्षियों के प्रणय-प्रदर्शन पर व्यवस्थित रूप से कोई प्रयास नहीं किया है। अतः संस्कृत साहित्य के आधार पर पक्षियों के प्रणय-प्रदर्शन पर यह एक लघु प्रयास है।

प्रणय के क्षेत्र में पक्षी भी किसी से पीछे नहीं हैं। कुछ पक्षी यदि अपने पंखों को फैलाकर सुरीली ध्वनि कर संगिनो को रतमग्न करते हैं तो कुछ अपनी प्रणय वल्लभी को रिझाने के लिये चमचाती रंग-विरंगी पत्तियां, सीपियां और शंख एकत्र करते हैं।

पक्षियों में प्रणय-भावना

विश्वव्यापी कामदेव के सार्वभौमिक प्रभाव से समस्त जीवधारियों में प्रणय के क्षण आते हैं। उनकी यौवनावस्था में प्रणय की भावना जागृत होती है। इसी सुरभित जीवनावस्था में कामोन्माद

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विविध रूपों में प्रकट होता है। संस्कृत साहित्य इसका साक्षी है कि परम तपस्वी भी कामशक्ति से विकल हुए हैं।¹

जिस प्रकार मानव के लिये प्रणय भावना का जागरण तथा उसका प्रदर्शन स्वाभाविक माना गया है, उसी प्रकार पक्षियों में भी प्रेमोपसेवन अत्यन्त आवश्यक माना गया है। यदि सुंदरी अपनी सुन्दर आँखों की चितवन द्वारा प्रणय प्रदर्शन कर सकती है तो शुकी भी अपनी चंचल मदमदाती अँखियों से अपनी मानसिक प्रणय-सिक्तता प्रकट कर सकती है।

पक्षियों में नर का शरीर मादा की अपेक्षा अधिक सुंदर होता है। पक्षी अपने शैशवकाल में इतने अधिक सुंदर नहीं होते, लेकिन जैसे-जैसे ये यौवन की तरफ कदम रखते जाते हैं उनका रूप सौन्दर्य भी बढ़ता जाता है। प्रौढ़ावस्था में पक्षियों के परों की सुंदरता पूर्णता को प्राप्त कर लेती है, इसलिये नर-मादा एक दूसरे की ओर तीव्रता से आकर्षित होते हैं। नर का आकर्षक सुन्दर शरीर मादा की मदभरी आँखों में उन्माद भर देती है। पक्षियों के प्रणय-प्रदर्शन में उनका गायन, नर्तन, ऊँची उड़ान, आलंगन, चुम्बन, जल-क्रीड़ा, नीड़-निर्माण, पँख फैलाना, दुम उठाना आदि उद्दीपनों द्वारा प्रणय भावना का प्रदर्शन करना पाया जाता है।

पक्षी-समाज में मादा की अपेक्षा नर-प्राणियों की संख्या अधिक होती है। अतः प्रणय-बन्धन (Pairing) के प्रयत्न में प्रतिद्वन्द्विता का अधिक सामना करना पड़ता है। नर-पक्षी को अपने प्रणय-प्रदर्शन में विविधता तथा कामोन्तेजक क्रिया कलापों में निपुणता लानी पड़ती है।

प्रणय पक्षियों के जीवन की स्वाभाविक एवम् अनियंत्रित प्रवृत्ति
कामानुभूति मानव की ही नहीं पक्षियों के जीवन की भी एक स्वाभाविक एवम् अनियंत्रित

1. उन्मन्त प्रेमसरम्भादारभन्ते यदंगताः ।

तत्र प्रत्यूहमाथातुं ब्रह्मापि खालु कातरः ॥77॥

विश्वामित्र पराशर प्रभृतयो वाताम्बुराश्रित ।

स्तेडपि स्त्री मुखा पंकजं सुललितं दृष्ट्वैव मोहं गताः ।

शााल्यन्नं संधूतं पयोदधि युतं ये भुञ्जते मानवा

स्तेषामिन्द्रियनिग्रहो यदि भवेदिध्यः प्लवेत् सागरे ॥82॥

। शृंगार शतकम् ।

प्रवृत्ति है। कामोन्तेजना प्राणी को अन्धा बना देती है। तथा उसे चेतनाचेतन का भी विभेद नहीं रहता है।¹

पक्षियों में इस स्वाभाविक एवम् अनियंत्रित प्रवृत्ति का ज्वार प्रायः यौवन में ही आता है लेकिन वार्धक्य (वृद्धावस्था) भी इसका अपवाद नहीं कहा जा सकता।

पक्षियों में प्रणय-प्रदर्शन की विविधता

पक्षियों में प्रणय निवेदन के विभिन्न तरीके पाये जाते हैं। प्रणय-बन्धन की अवस्था प्राप्त करने के बाद नर पक्षी मादा को विविध प्रकार से आकर्षित करने का प्रयास करते हैं। गाने वाले पक्षी जब काम विह्वल होते हैं, तो वे जोर जोर से गाना आरम्भ कर देते हैं। प्रणय-काल में नर पक्षियों के गले में एक विशेष प्रकार की मधुरता तथा आकर्षण पैदा हो जाता है। प्रणय-गीत गाने में ये पक्षी इतने तल्लीन हो जाते हैं। कोकिल (Cuckoo) और पपीहा (Hawk Cuckoo) ऐसे ही पक्षी हैं जो उन्मादोन्माद होकर दिन-रात प्रणय गीत गाते हैं और पपीहा तो प्रणयोपरान्त भी कुछ समय तक गाता रहता है।

कुछ पक्षियों की प्रणय भावना वसंत के आगमन पर जागृत होती है तथा वह वृक्षों की डालियों पर बैठकर ऊँचे स्वर में प्रणय गान शुरू कर देते हैं तथा कुछ आकाश में ऊँचाई तक उड़-उड़ कर प्रणय-निवेदन करते हैं। जलचर पक्षी अपनी प्रेयसी को आकर्षित करने के लिये जल में डुबकियाँ लगाकर विविध प्रकार की जल क्रीडार्यें करते हैं।

कुछ पक्षी अपने पंखों में हवा भरकर तथा अपनी पूँछ को उन्नत कर सुरीले स्वर के साथ प्रणय-नृत्य कर मादा में काम-भावना जागृत कर देते हैं। कुँज पक्षी अपनी प्राणवल्लभा को लुभाने के लिए चमकीली रंगीन पत्तियाँ, सीपियाँ और शंख एकत्र कर आकर्षक आवाज में प्रणय-गान गाता है।

भारत के राष्ट्रीय पक्षी मोर (Peacock) का प्रणय-नृत्य प्राचीन काल से ही सर्वविदित है।

- 1 ध्यू ज्योतिः सलिल मरुतां संनिपातः क्वमेघः
सदेशार्घाः क्व पटु करणौः प्राणिभिः प्राणिया
इत्योत्सुक्याद परिगणायन् गुह्यकस्तु ययाचे ।
कामार्ता हि प्रकृति कृपाणाश्चेतना चेतनेषु ।

संस्कृत साहित्य में इसकी प्रणय लीला का बड़ा ही अनुठा वर्णन दिया गया है। वर्षा ऋतु के आरम्भ होते ही मोर काम-भावना से उन्मत्त होकर पँखों को चक्राकार करे प्रणय-नृत्य में इतना लीन हो जाता है कि मादार्थ मयूर की मनमोहन काया पर मंत्र मुग्ध होकर उसके चारों ओर खड़ी हो जाती है। और वह फिर भी नृत्य करता रहता है :

मण्डलीकृत्य बर्हाणि कण्ठैमधुर गीतिभिः

कलापिनः प्रनृत्यन्ति काले जीमूत मालिनी ।

कबूतर (Pigeon) के प्रणय-प्रदर्शन का तरीका अत्यन्त रोचक है। नर मादा के पास आकर गला-फुलाकर अपनी विशेष आवाज में (गुटर-गूँ) करते हुए नृत्य करने लगता है। मादा कुछ समय तक इस प्रणय-नृत्य के प्रति उदासीनता प्रदर्शित करती हुयी उदासीन प्रतीत होती है। तथा शान्त भाव से दाना चुगती रहती है। लेकिन कुछ समय के बाद नर कबूतर मादा के हृदय में काम-संचार करने में सफल हो जाता है। मादा नर कबूतर के प्रणय-जाल में उलझ जाती है। तथा दोनों भविष्य में प्रतिपल साथ रहने का संकल्प कर ग्रह निर्माण में व्यस्त हो जाते हैं। इसके बाद नर एवम् मादा दोनों ही एक दूसरे के प्रति विलक्षण प्रणय भावना से प्रति-क्षण घर की छतों, छज्जों, प्रागणों, में कामान्ध होकर विचरण करते रहते हैं। नर मादा के इर्द-गिर्द रहकर प्रणय-नृत्य एवं प्रणय-गान को गाते हुए विविध प्रकार से प्रणय का प्रदर्शन करने लगते हैं। कबूतर के प्रणय-प्रदर्शन का वर्णन संस्कृत काव्य में बड़े ही अनुठे ढंग से किया है—

कलक्वणित गर्भेण कण्ठेनाधूणितिक्षणः

धारावतः परावृत्य रिरं तुश्चुम्बाति प्रियाम् ।

पक्षियों में दाम्पत्य प्रणय का आदर्श

संस्कृत साहित्य में चक्रवाक (Chukar) के दाम्पत्य-प्रणय को आदर्श माना गया है। इस पक्षी का दम्पति सदैव प्रतिपल साथ-साथ रहता है। जो कि इनके प्रगाढ़ प्रणय का द्योतक है। नैवधकार ने तो चक्रवाक दम्पति के प्रणय प्रदर्शन को देखकर उनको कामशास्त्र विद् की उपमा दी है। महाकवि माघ ने चक्रवाक के चुम्बन को उद्धरित करते हुए उनके प्रणय आदर्शता को व्यक्त किया है—

मुग्धायाः स्मरलालितेषु चक्रवाक्या ।

निः शंकदयिततमेन चुम्बितायाः ॥

संस्कृत साहित्य में चक्रवाक के निशाकालीन विरह-क्रन्दन की चर्चा स्थान-स्थान पर परिलक्षित हुयो है। सूर्य को अस्ताचलगामी होते देखकर एक करुण हृदय कवि ने उनके आने वाली विरह-वेदना का ध्यान करके उन्हें पूर्व से ही ढाढ़स बंधाने का प्रयास किया है—

अस्तंगतो डयमरविन्दवनैकैवन्धुर्भास्वान्न लंघयति कोडपि विधिप्रणीतम्
हे चक्र! धैर्यमवलम्य विमंच शोकं धीरास्तन्ति विपदं न तु दीनचिन्ताः ॥

पक्षियों में सती प्रथा

पक्षियों में दाम्पत्य-प्रणय, घनिष्ठता की इस चरम सीमा तक पहुँच जाता है कि दम्पति में एक का अभाव दूसरे की मृत्यु का कारण बन जाता है। सारस दम्पति (Crane) में नर के मरने पर मादा कुछ समय तक क्रन्दन करती है। तथा अन्त में वियोग में जीवन को ही समाप्त कर देती है। ऐसा प्रणय मादा द्वारा ही नहीं प्रदर्शित किया है।

बल्कि नर के लिये भी मादा का वियोग असह्य होता है तथा मृत्यु का कारण बन जाता है।

पक्षियों में बहुपत्ति (Polyandry) तथा बहुपत्ति (Polygamy) प्रथा

कबूतर व मयूर के ठीक विपरीत बटेर-पक्षी (Quail) में नर नहीं बल्कि मादा बटेर अपने प्रणय-प्रदर्शन से अनेक नरों को आकर्षित करती है। काफी समय के परीक्षण के बाद उनमें से एक नर के साथ प्रणय-सूत्र में बंध जाती है, ग्रह निर्माण करती है, अंडे देती है, और फिर नर पर अंडों के सेने (hatching) तथा उनके प्रतिरक्षण का कार्य छोड़कर स्वयं प्रणय-मुक्त हो जाती है। कुछ दिनों के विचरण के बाद पुनः किसी अन्य नर की प्रणय-परीक्षा में व्यस्त हो जाती है। उससे जोड़ा बांधती (pairing) है, घर बनाती है, अंडे देती है तथा फिर तोसरे साथी से प्रणय की प्रबल भावना से अपना ग्रह त्याग करती है। इस प्रकार से बटेर मादा एक से अधिक नरों के साथ प्रणय सूत्र में बंधकर अपने जीवन-साथी को चुनती है।

नरों में बया-पक्षी (वीवर बर्ड) एक ही ऋतु में एक से अधिक प्रणय-संबंध स्थापित करता है।

पक्षियों में प्रणय-सीमा (Breeding Territory)

जन्तु जगत में विशेषकर पक्षियों में प्रणय-लीला क्षेत्र का निर्धारण होता है। इस प्रणय-क्षेत्र सीमा की रक्षा का उत्तरदायित्व नर-पक्षी का होता है। प्रायः अन्य नर दम्पति के नर को अन्य नरों, जो कि प्रणय में बाधा डालने का प्रयास करते हैं, प्रणय सीमा से बाहर खदेड़ना पड़ता है। तथा मादा के मस्तिष्क में सुरक्षा की भावना जागृत करनी पड़ती है। प्रणय सीमा की सुरक्षा में नर को अन्य नरों से द्वंद भी करना पड़ सकता है। और उसमें विजय पाकर नर-पक्षी प्रणय-गान गाकर अपनी प्रेयसी को अपनी शक्ति प्रदर्शन से आकर्षित करता है।

ग्रन्थ-सूची

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Corbett National Park
Ramnagar (Nainital), U.P.
Phone No. 189
- (3) Director
Dudwa National Park
Lakhimpur Kheri, U.P.
Phone No. 2560
- (4) Dy. Conservator of Forests
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4. The aims and objects of the Society are :—

- (a) To promote interest in and impart knowledge regarding the preservation and conservation of all forms of wildlife, particularly among the youth of the country.
- (b) To co-operate with the Govts. of India and States and with other Societies and Institutions having similar aims and objects in working for the interests of wildlife.
- (c) To assist in enforcing and actively supporting the Forest Acts, Wild Birds and Animals Protection Acts and Rules etc. of States and the Indian Arms Act and Rules in so far as they pertain to wildlife and to bring to the notice of the authorities any infringement of the same and to assist in the detection and prosecution of offenders in respect of such laws.
- (d) To advise and help the Govt. and wildlife administrators in the formation, maintenance and protection of Sanctuaries and National Parks, the preservation of wildlife in general and rare species of India in particular and in the introduction of exotic species into the country, the rehabilitation of rare species etc. and in the revision on rational lines of the shooting and fishing rules, so as to conserve and increase wildlife stocks.
- (e) To raise funds for the carrying out of the above aims and objects and to found and maintain museums, reading rooms and libraries of natural history in order to disseminate knowledge regarding wildlife.
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- (g) To carry out publicity and propaganda for the preservation of wildlife in India by means of monographs, journals, films, film strips and other feasible methods.
- (h) To assist members of the Society in obtaining shooting and fishing facilities and facilities for viewing and photographing wildlife in India.
- (i) To conduct research into the problem of Wildlife management in India, and in pursuance of this, to initiate, encourage and, where possible assist in projects for the study of threatened species and related subjects and to provide reference and research facilities for such work.
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Fig. 2. Premigratory flocking of Demoiselle Cranes at Lalpari Reservoir, Rajkot.

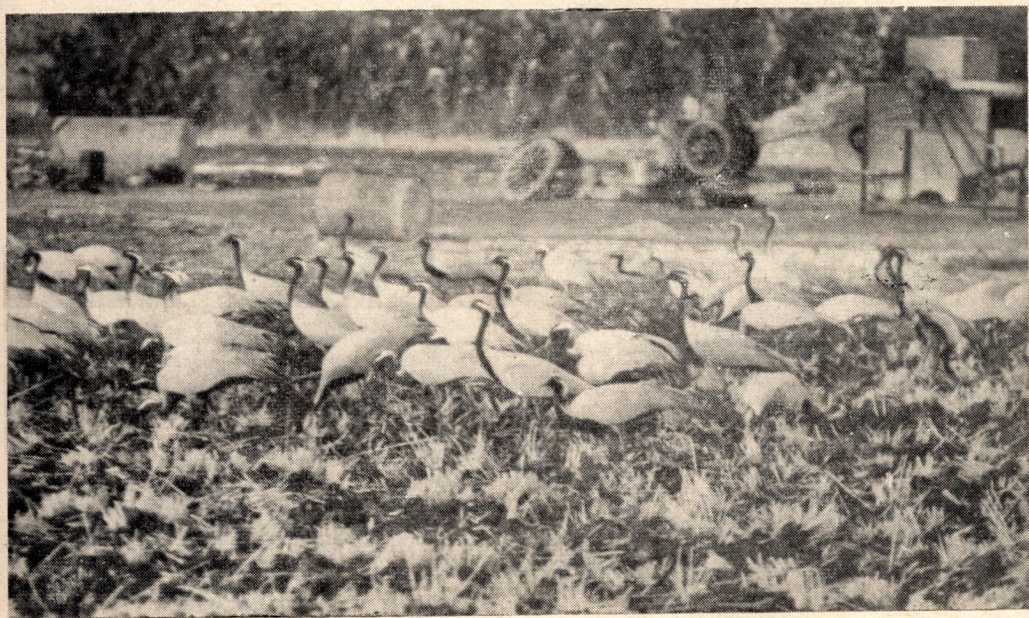


Fig. 3. Demoiselle Cranes feeding in the crop fields.

(See Article on Page 31)

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